Feb. 16, 1926. 1,573,772

S. McCLATCHIE

VACUUM CLEANER

Original Filed June 5, 1920 3 Sheets-Sheet 1

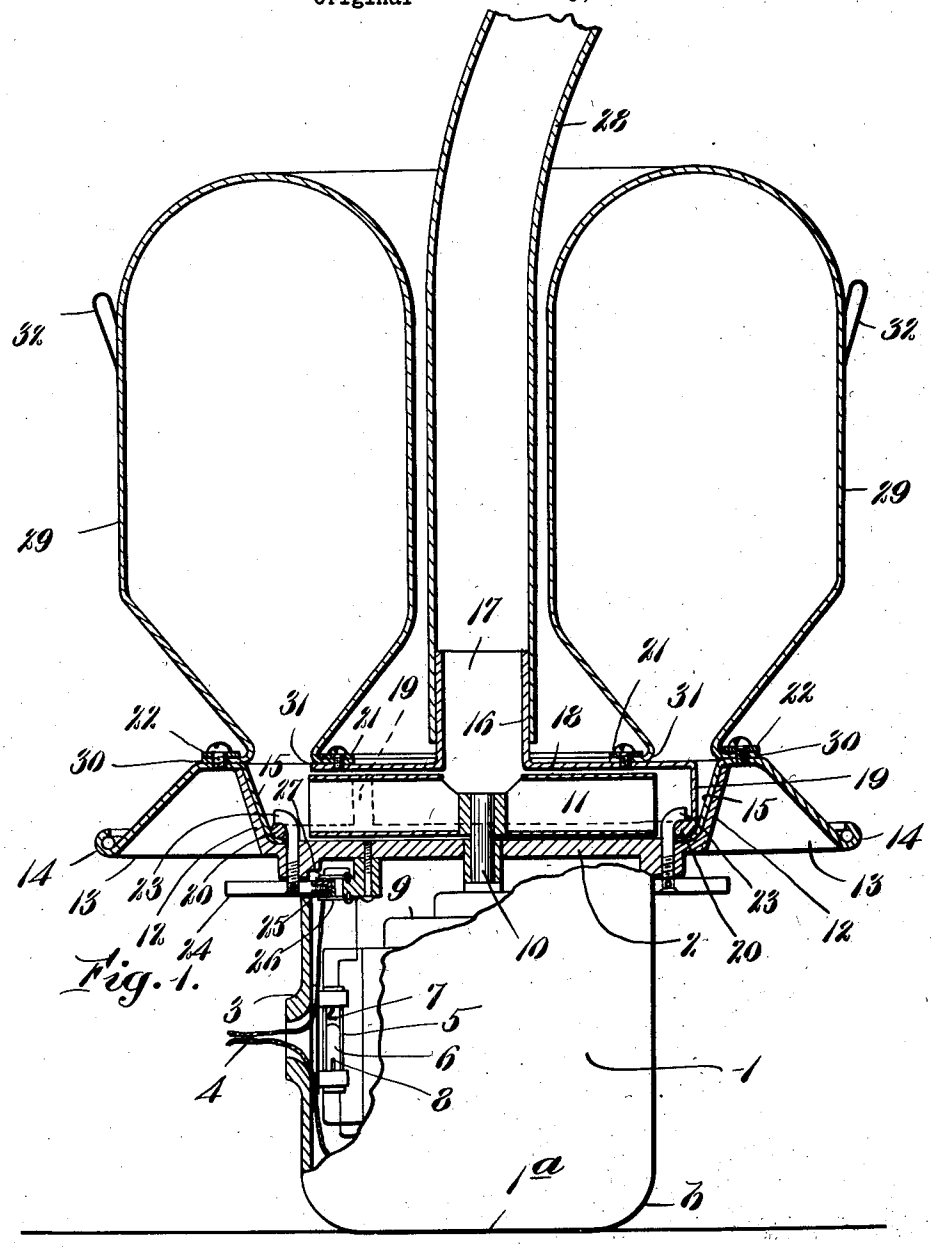


Fig. 1.

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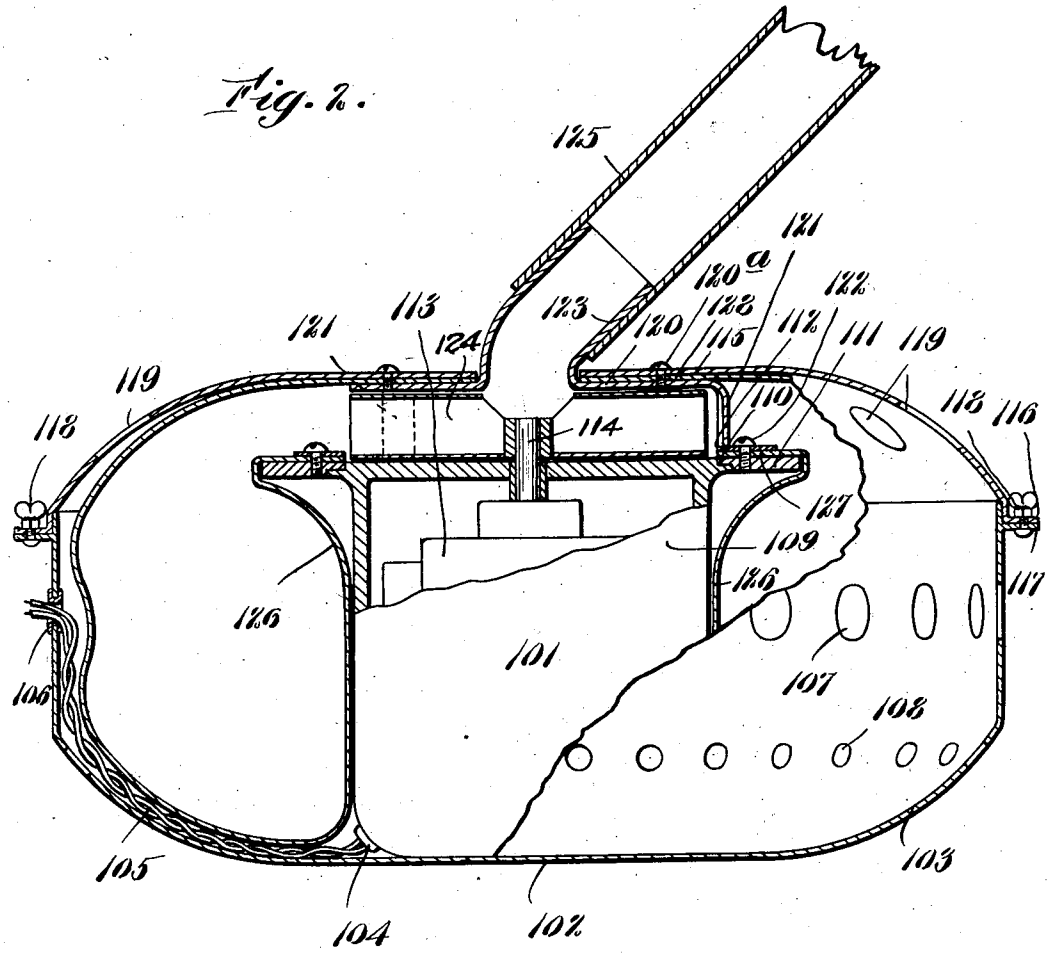
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Original Filed June 5, 1920 3 Sheets-Sheet 2

Fig. 2.



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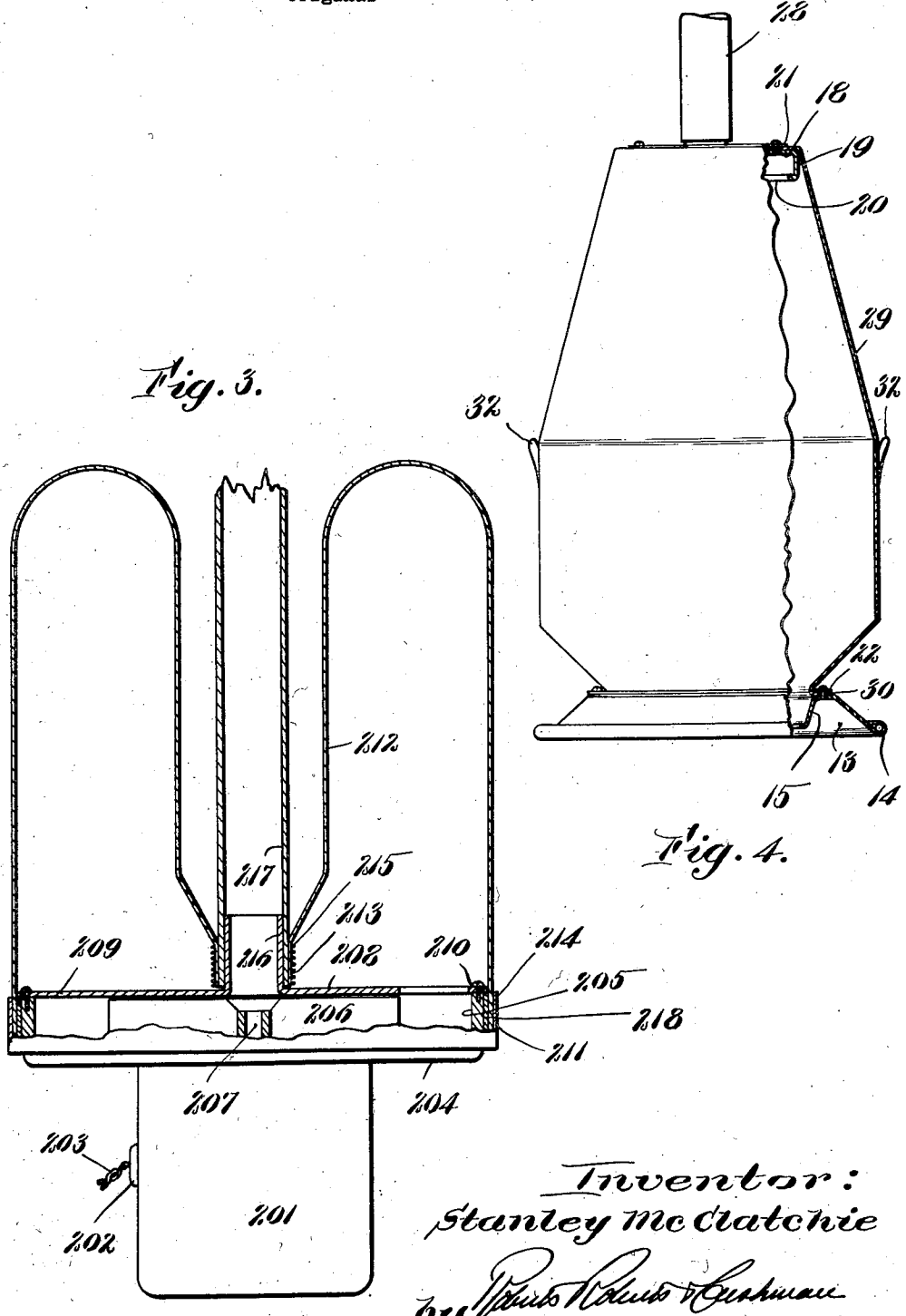


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

STANLEY McCLATCHIE, OF STUTTGART, GERMANY.

VACUUM CLEANER.

Application filed June 5, 1920, Serial No. 386,906. Renewed March 8, 1924.

To all whom it may concern:

Be it known that I, STANLEY McCLATCHIE, a citizen of the United States of America, and resident of Stuttgart, Germany, have invented new and useful Improvements in Vacuum Cleaners, of which the following is a specification.

My invention relates to vacuum cleaning apparatus, and consists in improvements in the structure and arrangement of the dust collecting receptacle with relation to the vacuum cleaning apparatus of which it forms a part. Among the objects of my invention, is the provision of a dust collecting receptacle which may be readily attached to and detached from the apparatus and emptied of dust collected therein. The improvements herein described may be incorporated in various forms or types of vacuum cleaning apparatus; I illustrate them in connection with vacuum cleaning apparatus embodying other inventions of mine which are the subject matter of an application for United States Letters Patent filed by me concurrently herewith, and serially numbered 386,903.

By means of the improvements herein described, a dust collecting receptacle is provided which has an ample opening for the reception of the dust laden blast of air produced by the vacuum cleaning apparatus, which takes up little room when in place, which is easily detachable and removable as a whole from the apparatus which it serves, and which may be opened out and emptied with facility.

Other objects and features of my improvements will appear in the course of the description of the apparatus. In the drawings hereto annexed, which illustrate alternative embodiments of my improvements.

Fig. 1 represents one form of vacuum cleaning apparatus shown in elevation, partly broken away and in section;

Fig. 2 illustrates an alternative form of apparatus, also in elevation, partly broken away and partly in section;

Fig. 3 illustrates another alternative form in elevation, partly broken away, and partly in section;

Fig. 4 illustrates in elevation the dust-collecting receptacle of the apparatus shown in Fig. 1, when said receptacle is elongated for purposes of emptying dust therefrom.

Referring to Fig. 1, 1 represents a metallic cylindrical motor-housing provided with an externally smooth bottom 1^a, smoothly rounded lower edge 1^b, and a cover 2. The housing 1 is perforated as at 3 for the introduction of the electric cords or lead wires 4, this point of entry being preferably on the side of the housing 1, about midway from the bottom to the top. The motor 9 is securely mounted in the interior of the housing 1 and carries the fan shaft 10.

The draft generating fan 11 is mounted on the motor shaft 10 and when in use is enclosed between the housing cover 2 and the top plate 18, these two members when the apparatus is assembled and in operation, are component portions of the motor and fan housing. The plate 18 is provided with a preferably integral tubular extension 16, the interior of which provides the axial induct port 17 to the fan 11.

The educt port of the fan is peripheral and extends entirely around the fan, the space between the housing cover 2 and the top plate 18 constituting the peripheral educt port. The motor and fan housing, for purposes presently to be described, is provided with a peripheral extension composed in the instance shown of several pieces or parts, but which as a whole constitutes a means of support for the apparatus when it is tipped to its operating position. The housing cover 2 is provided at its rim with a flaring flange 12 which serves as a guard for the fan, and also as a support for the securements of the dust collector. The rim 13 fits within the flaring flange 12, its inner portion 15 being provided with an inwardly extending ledge or flange on which the ring 20 rests as will presently be described. The outer periphery of the rim 13 is rolled as at 14 so as to present a smoothly rounded surface of ample radius adapted to roll or slide easily over any surface with which it may be in contact, when, as is intended, the apparatus is tipped so as to lie in inclined position.

The plate 18 which serves as an enclosure at one side of the fan 11 is provided with an extension, consisting in this instance of three or more outwardly and downwardly extending arms 19 which at their lower ends are attached to the ring 20 which, as above indicated, rests on and fits closely within the flange or ledge formed on the inner part 15 of the rim 13. In order to secure the

above mentioned members firmly together there are provided, in the overhanging ledge portion of the housing cover 2, a number of catches 23. These catches are manipulated by means of the short arms 24, which, as shown in the drawings, are accessible to the person using the apparatus. Thus the catches engage the extension from the top plate 18, and therethrough secure the rim 13, and dust collector 29, to the apparatus. One of these catches is associated with means for opening and closing the motor circuit so that when this catch is moved to disengage the ring 20 and rim 13, the motor circuit will be open and remain so. This is to guard against accidental starting of the motor and fan when the latter is not enclosed by the members which normally constitute this housing. One of the catch manipulating arms 24 is prolonged so as to extend into the motor housing, through an aperture provided for the purpose. This inward extension 25 carries a suitable insulated conducting strip which, when the arm 20 is turned so as to lie close to the outer periphery of the housing 1, is removed from between the contact members 26 and 27 and thus keeps the motor circuit open even though the other circuit controlling devices may be in closed circuit position. When the apparatus is assembled and the ring 20 and rim 13 locked in position shown in Fig. 1 by means of catches 23, the inward extension 25 of one of these catches makes contact with the members 26 and 27 and establishes a closed circuit.

The dust collecting receptacle 29 is of peculiar form, being substantially tubular and capable of being telescopically folded within itself. For this purpose the tube is preferably tapered so that the larger end or lip 30 is secured to the rim extension 13 by means of the clamping plate 22 and the smaller lip 31 is similarly secured to the plate 18 by a clamping ring 21. When secured in this way the two lips of the dust receptacle are concentric and provide between them an annular opening which is in effect a continuation of the peripheral educt port of the fan 11. Tabs 32 may be provided on the dust receptacle 29 for convenience in manipulating the receptacle. It will be observed that the entire apparatus above described is symmetrically disposed about an axis coincident with that of the fan shaft 10 and induct port 17.

When it is desired to remove the dust receptacle for emptying, the catches 23 are turned by means of their manipulating arms 24 so that the plate 18 and rim 13 are at once released from securement to the other parts of the housing. The rim 13 can then be lifted, together with the plate 18, flexible tube 28, and dust receptacle 29, and when these removed parts are taken to the place where the receptacle is to be emptied, the plate 18 is simply drawn away from the extension 13 thus telescopically unfolding the receptacle 29 to its substantially tubular form affording an ample aperture within the inner flange 15 of the rim 13 for the escape of dust. The rim is adapted to be held down by the foot of the operator while the bag itself is thoroughly shaken down for the purpose of emptying the dust. Spreading of dirt in the emptying process is thus eliminated. The parts are easily replaced upon the motor housing and reclamped in position for further operation.

Referring now to Fig. 4: When the dust-collecting receptacle, having been removed from the vacuum cleaning apparatus, is opened out so as to shake the dust therefrom, it assumes substantially the shape shown in Fig. 4. The receptacle is preferably taken away for emptying with its several parts occupying substantially the same position or relation as that which they occupy as shown in Fig. 1, namely, with the ring 20 seated in the inturned lip of the flange 15. When the receptacle is to be opened out the operator places the rim 13 on a piece of paper on the floor, holds it down with his foot, and thoroughly shakes the bag, using the flexible tube as a handle. When the dust receptacle is to be replaced on the vacuum cleaning apparatus, the tabs 32 will be found convenient, since by means of these that portion of the receptacle which is of larger diameter than the rest can be held up, while the tapered portion is telescopically folded within it so as to bring the ring 20 again to rest on the inner ledge of the flange 15.

An alternative form of apparatus in which my improvements may be embodied is shown in Fig. 2. The housing for the operative parts comprises the motor casing 101 and an outer dished bottom plate 102 which may be riveted to the housing 101 or otherwise secured so as to provide a smooth bottom surface for the apparatus. The bottom plate 102 is smoothly rounded upward around its periphery 103 and thence extends upward in cylindrical form to the flange at 117. The housing 101 is provided with an aperture at 104 for the insertion of the electric cord 105 which is also led through a suitable aperture 106 into the cylindrical side of the outer housing plate. The motor casing 101 has a suitable cover 109, this being provided with a ledge 110 which serves as a seat for the ring plate 111. The motor 113 is mounted inside the casing 101 and carries the fan shaft 114, this fan 124 operating in the usual manner. The upper surface of the cover 109 serves to house one side of the fan 124, the other side of which is covered and protected by the plate 120. This plate 120 has three or more peripheral

arms 121 which extend outward and then downward so as to rest upon the ring 112 which is secured as by screws 122 to the ring plate 111. The top plate 120 is provided with a preferably integral tubular extension 123 which serves as an induct port or channel to the fan 124. The educt from the fan extends entirely around its periphery between the plate 120 and the ring plate 111. The plate 120 is secured as by screws 120[a] to the cover plate 115. This cover plate has a flange 116 which is seated upon the flange 117 and is secured thereto as by wing nuts 118. Securement of the cover-plate 115 by means of these wing nuts 118 bring the ends of the arms 121 to bear firmly on the ring 112 and thereby holds the ring plate 111 securely seated on the ledge 110. The outer members of the above described motor and fan housing are provided with perforations at 107, 108 and 119 to allow the escape of air from the dust collecting receptacle 126. This receptacle is generally speaking tubular in form and, like the dust receptacle shown in Fig. 1 and described above, is telescopically foldable within itself. One end 127 of this receptacle is securely clamped between the ring 112 and the ring plate 111 by means of the screws 122. The other end of the dust receptacle 128 is clamped between the outer cover plate 115 and the fan covering plate 120 as by screws 120[a]. The annular space between the motor housing 101 and the outer member 103 and 115 of the above described housing provides the necessary room for the inflation of the dust receptacle 126 through the meshes of which air escapes and passes out through the holes 107, 108 and 119 leaving the dust inside the receptacle. A flexible tube marked 125 in Fig. 2 is secured to the educt port extension 123 and will carry at its free end a dust inhaling nozzle.

To remove the dust-collecting receptacle for emptying, disengage the top plate 115 by loosening the wing nuts 118; then, using the flexible tube 125 as a handle, lift the cover plate 115 with the inner plate 120 from the body of the housing; then insert a hand between the cover plate 115 and the body of the housing, grasp the ring plate 111 through the textile dust receptacle 126, and lift ring plate 111 off the ledge 110. Then turn over the cover plate 115 so that the ring plate 111 will rest on it together with the dust receptacle 126. To empty, turn the cover plate 115 over, and let the ring plate 111 fall, extending the receptacle to substantially tubular form and discharge the collected dust.

Still another alternative form in which my improved dust-receptacle may be embodied, is shown in Fig. 3. Here 201 represents the motor casing; 202 the aperture for the electric cord, 203 the electric cord, 204 a peripherally extending top or cover for the motor casing, 205 an upwardly extending flange preferably integral with the top 204; 206 is a fan mounted on the motor shaft 207. The cover plate 208 is provided with radial extensions 209, which are joined at their outer ends by the ring 210, between which and the plate 208 is the space which constitutes the peripheral educt from the fan 206. An axial tubular extension 216 from the plate 208 provides the central induct port for the fan, and also means for detachably securing the flexible tube 217.

In the form of apparatus shown in Fig. 3, the dust-collecting receptacle 212 is, as in the other examples described, a bag which is substantially tubular and telescopically folded upon itself. In this case, however, the smaller end of the tubular receptacle is of relatively much less diameter than those of the other examples herein shown, and is of a size adapted to fit closely over the end of a flexible tube 217, to which it is firmly clamped as by means of a spiral spring 215, which holds the small end 213 of the receptacle 212 onto the end of the flexible tube. The other and larger end of the receptacle 212 is shown at 214, clamped against the ring 218 by means of a ring 211.

To remove and empty the receptacle 212 the large end of the bag with its clamping rings is removed from the flange 205 and the flexible tube 217 pulled off the tubular extension 216. Receptacle 212 is then taken, together with the flexible tube 217, to the place where the dust is to be emptied, the receptacle is unfolded from within itself, and the dust shaken out. To replace the receptacle on the vacuum cleaning apparatus, the flexible tube 217 is reattached to the extension 216, and ring 218 is again slipped on over flange 205.

In the several forms of apparatus herein illustrated, the flexible tube, and the dust collector, are removable in assemblage from the apparatus, and replaceable thereon likewise in assemblage. The annular securement for the dust collector, when removed therewith in such assemblage serves to distend the mouth of the dust collector and facilitates removal of the dust.

I claim:

1. Vacuum cleaning apparatus, comprising a rotary fan, an axial induct to said fan, and an educt therefrom disposed about the periphery of the fan, a tubular dust-collecting bag adapted to fold telescopically within itself, one end of said bag detachably secured around one side of said peripheral fan educt, the other end similarly secured around the other side of said educt, the bag adapted to be unfolded to straight tubular form when detached from said educt.

2. Vacuum cleaning apparatus, compris-

ing a rotary fan, a plate at one side of said fan, a ring adapted to surround said fan and spaced therefrom, and from said plate, to form a peripheral educt for the fan, said plate and ring detachably secured in said positions relatively to the fan, a tubular dust collecting bag adapted to fold telescopically within itself, one end of said bag secured to said plate, the other secured to said ring, the bag adapted to be unfolded to straight tubular form when said plate is removed from said ring.

3. Vacuum cleaning apparatus, comprising a rotary fan, a motor therefor, a motor casing, a plate at one side of said fan, a ring adapted to surround said fan and spaced therefrom and from the plate, to form a peripheral educt for the fan, means on the motor casing to secure said ring and plate in said positions relatively to the fan, a tubular dust-collecting bag adapted to fold telescopically within itself, one end of said bag secured to said plate, the other secured to said ring; the bag adapted to be unfolded to straight tubular form when the said plate is removed from said ring.

4. Vacuum cleaning apparatus, comprising a rotary fan, a cover plate for one side of said fan, provided with an axial induct thereto, a ring adapted to surround said fan and spaced therefrom and from said plate, to form a peripheral educt for the fan, said plate and ring detachably secured in said positions relatively to the fan, a tubular dust-collecting bag adapted to fold telescopically within itself, one end of said bag secured to said cover plate, the other secured to said ring, the bag adapted to be unfolded to straight tubular form when said cover plate is removed from said ring.

5. Vacuum cleaning apparatus, comprising a rotary fan, a motor therefor, a motor casing, a cover plate for one side of said fan provided with an axial induct thereto, a ring adapted to surround said fan and spaced therefrom and from the cover plate to form a peripheral educt for the fan, means on the motor casing to secure said ring and plate in said positions relatively to the fan, a tubular dust-collecting bag adapted to fold telescopically within itself, one end of said bag secured to the cover plate, the other secured to said ring, the bag adapted to be unfolded to straight tubular form when the cover plate is removed from said ring.

6. In a vacuum cleaning apparatus, the combination of a fan, a housing providing an axial induct and peripheral educt for said fan, a dust-collecting receptacle of flexible material, telescopically foldable within itself and substantially tubular when extended, one end of said receptacle secured to said housing at one side of the peripheral fan-educt, the other end secured to the housing at the other side of the peripheral fan-educt, the receptacle removable as a whole from said fan with a part of the housing normally on the induct side of the fan, and adapted to be extended to substantially tubular form.

7. In vacuum cleaning apparatus, the combination of a fan, a housing providing an axial induct and peripheral educt for the fan, a flexible tube communicating with said induct, a dust-collecting receptacle of flexible material, telescopically foldable within itself and substantially tubular when extended, one end of said receptacle secured at one side of the peripheral fan-educt, the other end secured at the other side of the peripheral fan educt, said receptacle removable as a whole from the fan together with the flexible tube and adapted when so removed to be extended to substantially tubular form.

8. In vacuum cleaning apparatus, the combination of a fan and housing therefor adapted to discharge the fan blast about its periphery, a dust collector, means to secure the ends thereof circumferentially of the fan at either side of the fan, said securing means and the dust collector being removable as a unit from the apparatus.

9. In vacuum cleaning apparatus, the combination of a fan and housing therefor adapted to discharge the fan blast about its periphery, a dust collector and annular securements for the ends thereof at either side of the fan, one of said securements encircled by the other, and both with the dust collector being removable as a unit from the apparatus.

10. In vacuum cleaning apparatus, the combination of a fan and housing therefor adapted to discharge the fan blast about its periphery, a top plate enclosing one side of the fan, a ring supporting said top plate, a rim supporting said ring, means to engage said ring, and therethrough said rim, to bind both to the apparatus, a dust collector secured at one end circumferentially of said top plate, at the other circumferentially of said rim, the dust collector, top plate, and rim removable as a unit from the apparatus upon release of said ring.

11. In vacuum cleaning apparatus, the combination of a fan and housing therefor adapted to discharge the fan blast about its periphery, a top plate enclosing one side of the fan, a rim encircling the fan, an extension from the top plate engaging said rim, fastening means securing said extension and therethrough said rim to bind both to the apparatus, a dust collector secured at one end circumferentially of said top plate, at the other circumferentially of said rim, the dust collector, top plate and rim removable as a unit from the apparatus upon release of said fastening means.

12. In vacuum cleaning apparatus, the combination of an electric motor, fan, and housing therefor adapted to discharge the fan blast about its periphery, a dust collector, and securements for the ends thereof at either side of the fan, said securements and the dust collector being removable as a unit, movable fastening means on the apparatus, engaging said dust-collector securements, and a circuit-breaker operated by said fastening means to break circuit when the dust collector is released.

13. In vacuum cleaning apparatus the combination of a fan and housing therefor to discharge the fan blast about its periphery, an annular guard on the apparatus spaced from and surrounding the fan, a top plate enclosing one side of the fan, a rim resting within said annular guard, an extension from the top plate engaging said rim, fastening means on the apparatus, engaging said extension and therethrough binding the rim to the guard, a dust collector secured at one end circumferentially to the top plate and at the other circumferentially to the rim, said dust collector, top plate, and rim being removable as a unit from the apparatus upon release of said fastening means.

14. In vacuum cleaning apparatus, the combination of a fan and housing therefor, adapted to discharge the fan blast about its periphery, a flexible tube, a dust collector circumferentially attached at either side of said fan, said dust collector and flexible tube being separable in assemblage, from the apparatus.

15. A vacuum cleaner comprising, in combination, a portable casing having a fan and motor therein and adapted to roll freely on the floor and a length of hose connected axially to said casing and adapted to have a working tool secured thereto, said hose constituting the sole handle for said casing.

16. A vacuum cleaner comprising, in combination, a portable casing having a fan and motor therein and adapted to lie directly on the floor, and a suction hose attached to said casing and having the double function of constituting a connection for a cleaner tool and a handle for said casing, the portion of said casing which rests on the floor while said cleaner is being used having a rounded shape to permit it to roll and tip bodily to accommodate itself to the movements of the hose.

17. A vacuum cleaner, comprising a hose and a casing secured to one end thereof and having a fan and a motor therein, said hose constituting a handle for said casing and said casing being symmetrical relative to the axis of said fan and motor so as to roll freely on the floor in accordance with the movements of the hose.

18. A vacuum cleaner, comprising a hose, a casing secured to the end thereof, and a motor and a centrifugal fan mounted inside the casing, said casing being symmetrical about the axis of the motor and having a plurality of air discharge openings opposite the edge of the fan and in line with the air discharge thereby.

19. A vacuum cleaner, comprising a hose and a casing formed as a surface of revolution about the axis of said hose, a motor and a fan in said casing and a dust separator carried by said casing, said casing adapted to roll freely on the floor while the cleaner is in use and a portion of the casing nearest said hose being of greater diameter than the portion furthest from the hose whereby said casing may assume a position with its axis oblique to the floor on which it lies.

20. A vacuum cleaner comprising a hose and a casing of rounded shape fastened to one end thereof, said casing adapted to roll freely on the floor and having an enlargement near the hose end defining a circumferential recess and a flexible electric cord leading from said recess.

Signed by me at Boston, Mass., this 28th day of May, 1920.

STANLEY McCLATCHIE.